



Field decisions • Tank to target

Making Every Glyphosate Spray Count



**THE AIM:
REMOVE
COMPROMISES**

Getting the best from pre-drilling glyphosate isn't about one decision made at the spray tank. From knowing when – and when not – to spray, to product choice, water quality and application, we brought the experts together – Bayer's Roger Bradbury, De Sangosse's Rob Suckling and farmer and application specialist David Felce – to follow the journey from field decisions, tank to target.

Standing in a recently cultivated field at Midloe Grange Farm, Cambridgeshire, the black-grass initially looks relatively insignificant. Look a little closer, however, and considerably more plants begin to appear.

It's a useful illustration of the first challenge facing growers ahead of a pre-drilling glyphosate application, says Bayer's Roger Bradbury.

"When you first walk into a field, you can think there's not very much there. Once you get your eye in, there can be a lot more than you initially imagined."

But deciding what to do next requires more than simply identifying that black-grass is present.

For farmer and application specialist David Felce, the field in question is destined for spring barley. It wasn't considered a particularly bad field, but a relatively poor wheat crop the previous season left more space for the weed than he would have liked.

Moving the field into spring cropping is therefore the first part of his control strategy.



Roger Bradbury
Roundup Technical Manager



David Felce
Farmer & Application Specialist



Different fields. Different decisions.

The starting point is the target and the wider agronomic decision.

FIELD
1

SPRING BARLEY



TIME + CULTURAL CONTROL

The field has already received one cultivation and David's preference, conditions allowing, would be to cultivate again rather than immediately reach for glyphosate.

"I want to get the soil right first," he explains. "Because we're going into a spring crop, I'd prefer another cultivation under these conditions and then try to take out another flush if we get one in the autumn or early spring."

That decision also avoids treating too early only to have further weeds emerge later.

It's a reminder that making every glyphosate application count doesn't necessarily mean making more applications.

"There's no true replacement on the horizon for glyphosate," says Roger. "We have to protect it and use it responsibly, and sometimes that means thinking about other ways of managing those small weeds. Cultivation could be one of those."

Move to another field on the farm and the decision changes.

This one is destined for winter wheat. It has been ploughed and left as a stale seedbed for around three weeks, with Roundup applied approximately four to five days before our visit. Its effects are just beginning to become visible in the volunteers.

Black-grass pressure is relatively low and the field could be drilled now into good moisture and reasonable conditions.

David could wait for another flush of black-grass. But doing so introduces another risk – what will drilling conditions look like in two or three weeks?

FIELD
2

WINTER WHEAT



TAKE THE DRILLING WINDOW?

"My inclination is to drill this soon, get it rolled down and get the pre-em on," he says. "If I choose to wait for more black-grass to come, how long do I have to wait and what is the cost of that in terms of the weather and drilling conditions we might face? It's a gamble whichever way we go."

Roger believes this illustrates why there can't be a single prescription for every field.

"If it's a relatively low-pressure field, you have to mitigate risk to some extent," he says. "The conditions are good, so provided the seed goes in at the right depth and seed rate for the conditions, getting the pre-em on at the correct timing becomes important too."

"But timing of the Roundup treatment within a week of drilling at the right dose rate remains critical for an effective kill and to reduce the chance of transplanting weeds at drilling which put further pressure on the selective herbicide programme."

The contrast between the two fields is significant. One has time on its side and further cultural control opportunities; the other requires a judgement between waiting for potentially more weeds to emerge and taking advantage of good establishment conditions.

The starting point for effective glyphosate use is therefore the target and the wider agronomic situation, rather than the spray tank.

**Field history,
weed pressure, target
size, soil conditions,
following crop and
intended drilling
date all feed into
the decision.**

Match dose to the target.

540 g active/ha

**VERY SMALL SEEDLING
BLACK-GRASS**



720 g active/ha

**AS PLANTS APPROACH
3 LEAVES & TILLERING**



Where glyphosate is the right intervention, weed size and species matter.

In the spring-barley field, much of the emerging black-grass is still at the seedling stage – an inherently good stage for control, although its small size creates an application challenge.

Roger says 540 g glyphosate/ha is appropriate only for very small seedling black-grass. As plants move towards three leaves and begin tillering, he recommends moving to at least 720 g/ha.

Species matters too.

“Not all annual grasses are the same,” he says. “Black-grass is relatively straightforward to control compared with something like Italian ryegrass.

“And when we talk about tillering, a plant with one tiller is a very different prospect to something with ten. As plants become more heavily tillered, the rate has to reflect that.”

That reinforces the importance of looking closely at the population rather than basing the decision on how green the field appears from the gateway.

It’s also important not to focus solely on the weed that’s driving the decision to spray. At Midloe Grange, phacelia from a previous legume fallow mix was growing among the emerging black-grass and volunteers.

Although glyphosate is non-selective, not all species are equally susceptible, says Roger. “You need to consider the hardest weed or most difficult species you’ve got in the field, because that’s what drives your dose rate.”

So while pernicious grassweeds may be the primary target, the wider weed spectrum also needs to be considered.

Allowing other species to escape control could simply create a different weed problem further down the line.

Don’t let performance be chipped away

Product and dose are only the beginning.

Roger describes glyphosate performance as the result of multiple decisions – product choice, dose, timing, application equipment, nozzle, sprayer calibration, boom height, water volume and water quality.

Individually, each may appear a relatively small consideration. Collectively, they can determine the final level of control.

“You also need to consider the hardest weed or most difficult species you’ve got in the field.”

Rob Suckling, commercial technical manager at De Sangosse, describes it as starting with a theoretical potential for 100% control and then progressively eroding that potential.

“If the dose rate is sub-optimal, the weeds are too big, the formulation isn’t appropriate, the nozzle or water volume isn’t right, you’re using hard water, each factor chips away at that performance potential,” he explains.

Roger says the effect can become particularly noticeable when spraying conditions themselves are less than ideal.

“In really good conditions, you may get away with some of those compromises. When conditions become less favourable, they start to cumulatively impact efficacy.”

The aim, therefore, is to remove as many of the controllable compromises as possible.



Rob Suckling
Commercial Technical Manager

Know what's in the water.

338
ppm

MIDLOE GRANGE



100 L/ha ➤ 200 L/ha

**MORE WATER = MORE HARD WATER IONS
POTENTIALLY INTERACTING
WITH THE SAME DOSE**

One of those controllable factors is sitting unnoticed in the sprayer before the pesticide has even been added.

David uses mains water at Midloe Grange, stored in a plastic tank. Previous testing suggested it was around 350 ppm, but a fresh sample taken during our visit provided an opportunity to check it again.

Simply looking at the water sample reveals nothing about what's dissolved in it. Using a digital TDS meter, Rob records 338 ppm – confirming a hard water source.

"You can't tell whether water is hard or soft by looking at it," he says. "A TDS reading gives us a useful indication of water hardness."

For David, the result reinforces the value of knowing the carrier being used to deliver the pesticide.

Hard water contains dissolved positively charged ions which can interact with glyphosate. But the degree to which this affects field performance isn't determined by hardness alone. Formulation, glyphosate dose and water volume all influence the overall risk.

Roger explains that Bayer's Roundup formulations are designed to provide greater consistency in hard water situations, although there are circumstances where water conditioning can still have a role, particularly as hardness becomes more extreme or where lower glyphosate doses are combined with higher water volumes.

Rob says that distinction is important because water conditioning isn't simply a binary 'yes or no' decision.

"If you move from 100 litres/ha to 200 litres/ha, you're doubling the amount of hard water ions that can potentially interact with the same dose of herbicide.

"So formulation, dose, water volume and the actual hardness of the source all have to be considered."

Where conditioning is required, the conditioner should be added to the tank first so the water is conditioned before glyphosate is introduced.

Borehole? Test, don't guess

Knowing the source becomes even more important where farms use borehole water.

Rob says the hardness of borehole supplies can vary significantly and shouldn't be inferred from the local mains supply.

"The softest borehole samples I tend to come across are around 500-600 ppm, but we commonly hear of water at 1000 ppm or more.

"You have to approach it on a case-by-case basis. If you're using a borehole, make sure you know what the water hardness actually is."

At particularly high levels, water conditioning may be required even where a formulation has greater inherent robustness to hard water.

The message is straightforward: test it rather than assume.

“Particularly when you have small targets and a limited target area, it's important to get the delivery right. Without testing, you simply don't know what you've got.”

Tank to target.

100
L/ha

50
cm

10
Km/hr



Don't confuse hardness with pH

Water hardness is also sometimes confused with pH, says Rob, yet the two measurements describe different characteristics.

"Glyphosate itself is an effective buffering agent, so once it's added it will naturally move the spray solution towards an acidic pH."

Consequently, simply acidifying spray water shouldn't be treated as a substitute for understanding its hardness.

Rob also cautions against strongly acidifying glyphosate spray solutions unnecessarily, which can reduce the solubility of glyphosate.

The objective where hard-water antagonism is identified is to deal with the ions responsible for that interaction rather than simply chasing a lower pH.

Connect the tank to the target

Getting the chemistry right in the tank still only takes the application part way to its destination.

"The final part of the jigsaw is connecting what's in the tank with whatever the target is in the field," says David.

And again, he says the starting point is the target.

The one-to-two-leaf black-grass plants observed during the field walk present a very different application challenge to a large, developed weed canopy.

For small, exposed grassweeds, David favours around 100 litres/ha, provided the application conditions and product label permit it.

With less water carrying the glyphosate, concentration is increased, but crucially the spray still has to intercept and remain on a very small, upright leaf.

Boom height, forward speed, nozzle size, pressure and droplet characteristics therefore have to work together.

David advocates keeping the boom at around 50 cm above the target – effectively the ground where weeds are very small – and avoiding excessive forward speed.

"If you can travel at 10 km/hr, good. If you have a nice smooth seedbed, 12 km/hr can be okay, but where it's rough, coming down to around 8-10 km/hr will generally give a better result through improved boom stability and reduced turbulence."

Nozzle selection then has to reflect both target and conditions. A fine-to-medium spray may provide greater opportunity to intercept small exposed grassweeds, whereas a larger target or canopy can accommodate larger droplets and greater drift reduction.

As the target becomes larger and more complex, David says water volume may also need to increase.

"The important thing is to get the speed, pressure and water volume right, which determine the nozzle size, and then decide the appropriate nozzle type."

In other words, there is no universally 'best' nozzle or water volume – the application has to be built around the target.

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It's a common misconception that glyphosate is degraded in an alkaline environment through hydrolysis. That can be the case with some pesticides, but not glyphosate.
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Check the result. Protect the future.



Examples of glyphosate under-performing, courtesy of Bayer

Don't accept unexplained survivors

Why go to this level of detail?

Because glyphosate remains fundamental to many weed-control strategies and there is no equivalent replacement, says Roger.

The confirmation of glyphosate resistance in UK Italian ryegrass populations makes protecting its effectiveness increasingly important.

Roger stresses that resistance isn't 'created' in an individual plant by a poor application. Instead, repeated selection allows naturally less-sensitive individuals to survive, reproduce and gradually become a greater proportion of the population.

"Using sub-optimal dose rates, poor application practice or the wrong timing increases the risk of individual plants surviving," he explains.

That makes checking the result of an application as important as the decisions made before it.

"Are you seeing patches of weeds surviving or something that looks peculiar? That early vigilance and intervention is really important."

Glyphosate should also sit alongside cultural controls and effective selective chemistry rather than carrying the entire burden of weed control.

The contrasting decisions in David's two fields demonstrate exactly that. In one, another cultivation may be the most appropriate next step. In the other, a recent glyphosate treatment has helped create an opportunity to establish the following wheat crop in good conditions.

Different fields. Different decisions. The same objective – to use glyphosate where it adds most value and, when it is used, give every application the best possible chance of delivering robust control.

"If those plants aren't controlled by another method and go on to set seed, they represent a resistance risk."

FROM TANK TO TARGET Five questions before spraying

What's the target?

Consider species, growth stage, population, field history and whether another flush is likely.

Is glyphosate the right intervention now?

Consider cultivation, drilling date, following crop and other cultural controls rather than treating applications in isolation.

Are product and dose appropriate?

Match formulation and dose to the target, weed size and conditions.

Do you know your water?

Understand the water source and hardness, adopt a true water conditioner where needed, and consider water volume as part of the overall application.

Can you deliver it effectively?

Match nozzle, droplet, pressure, boom height, forward speed and water volume to the target.



Want to know more?

Visit the De Sangosse Clean Water. Clean Kill. Glyphosate Stewardship Hub for practical guidance on water quality, application and protecting glyphosate performance.

www.desangosse.co.uk/solutions/clean-water-clean-kill/

